

ABSTRACT OF THE DISCLOSURE

A system and process for correcting presbyopia with the system including a tissue removal system that preferably includes a laser system with means for forming a predetermined presbyopia correction contour corresponding to a predetermined ablation profile through controlled ablation of an exposed corneal stroma area of the eye such that a central zone of about 1-3 mm or, more preferably, 1.4 to 1.8 mm is left intact with a main, maximum presbyopia ablation zone bordering the untouched or hardly touched (e.g., a radiused transition edge) central zone. The annular maximum ablation zone in the stroma is defined by a smoothly curving, steep profile section which extends out from a central, non-ablation section of the profile. Further outward from the maximum ablation zone in the stroma is an annular treatment zone that is determined by a further section of the presbyopia correcting profile generally represented by a smoothing transition section that extends into another zone which is an unablated zone. The method and device for controlling the formation of the desired corneal stroma configuration preferably involves a presbyopic corrective module based on a predetermined profile determining equation that utilizes certain inputs which preferably include values determined by eye measurements and, preferably, also values pulled from a plurality of zone diameter ranges and a range for maximum depth. The manner in which this profile controlling information is implemented in the ablation or tissue removal process is preferably provided by modification of a present control system of one or more preexisting laser systems such as those used in hyperopia and myopia correction procedures. This modification can include, for example, an added software or hardware module, the formation of a mask with or without a mask movement assembly, or the formation of a suitable mold or shaping device for forming, for example, an erodible mask that can input the desired contour to the exposed corneal stroma. The system and apparatus of the present invention also preferably involve a microkeratome or the like for forming resections in the eye to expose the corneal stroma. A

positioning marker, cleaning system and drying system are also preferably used in the present invention to facilitate, for example, corneal flap formation, laser positioning, flap repositioning on a clean surface following ablation and providing a dry corneal stroma surface to the ablating laser.

With the system and method of the present invention there is provided a way to efficiently and safely correct problems associated with presbyopia while retaining good near and far vision capabilities and with reduced undesirable post-operative symptoms.

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